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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,079	08/17/2001	Duck Chul Hwang	1567.1018	2871

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EXAMINER

WILLS, MONIQUE M

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/931,079

Applicant(s)

HWANG ET AL.

Examiner

Wills M Monique

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Priority

Korean foreign priority document(s) 2000-47347 filed August 8, 2000 and 2000-76694 filed December 14, 2000, and submitted under 35 U.S.C. 119(a)-(d), has/have **not** been received.

Claim Objections

Claims 9 & 18 are objected to because of the following informalities: the brackets in claim 9 (lines 9-10) and claim 18 (line 13). Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 & 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the formula $(C_2S_x)_n$, variable n is not defined. Further, the term " n^2 " is of uncertain meaning, rendering the claims vague and indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6,9,11,12, 14-20, 22-24, 27 & 28-35 are rejected under 35 U.S.C. 102(e) as being anticipated by anticipated by Nakagiri et al. U.S. Patent 6,576,370.

Nakagiri teaches a positive electrode for a lithium sulfur battery comprising a lithium sulfide of the formula $(Li_xS)_n$ where $0 < x \leq 2$ and $n > 0$ (see abstract) where concrete examples include Li_2S_2 , Li_2S_4 , Li_2S_6 , Li_2S_8 , Li_2S_{12} (col.6, lines 35-40) . The active material also contains a conductive polymer (col.3, lines 10-15) including polyaniline, polypyrrole, polyacene, polythiophene and polyacetylene (col.7, lines 5-10). Other conductive agents such as carbon powder and fibers s, such as graphite powder, acetylene black powder and graphite fibers may be used (col. 8, lines 1-5). An organic polymer binder such as polyvinyl pyrrolidone may also be added to the cathodic material (col. 7, lines 60-68). An organic electrolyte solvent may be added to the positive electrode (col. 7, lines 45-5) including acetonitrile (example 1), dimethylformamide (col. 3, lines 35-40) and a polyethylene oxide binder (col. 7, lines 50-

Art Unit: 1746

60). The organic mixing solvent of the electrolyte inherently has a solubility of sulfur of 1 to 50mM. The electrolyte further comprises a lithium salt such as LiCLO_4 , LiCF_3SO_3 and/or $\text{LiN}(\text{CF}_3\text{SO}_2)_2$ (col. 7, lines 50-60) and may also employ nonaqueous solvents such as propylene carbonate (col. 7, lines 50-60). Lithium metal or carbonaceous material may be used as the negative electrode (col. 12, lines 20-25). The method of making the positive electrode includes dissolving a binder in an electrolyte solution and mixing a conductive agent and cathodic material to make a slurry. The slurry is coated on a current collector and dried. See column 8, lines 15-60 and Example 1. Therefore, the instant claims are anticipated by Nakagiri.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5,9,10, 14, 15-21 & 24-27 are rejected under 35 U.S.C. 102(e) as being anticipated by anticipated by Geronov et al. U.S. Patent 6,344,293.

Art Unit: 1746

Geronov teaches a cathodic material comprising an electroactive polycarbon-sulfide material of $C(S_x)$ (col. 7, lines 35-40) wherein x ranges from 2.5 to 50 (col. 7, lines 40-50), a conductive agent of graphite or conductive carbons (col. 9, lines 1-5), a binder in the amount of 2 to 30% by weight (col. 9, lines 15-20) including polyethylene oxide and polyvinylidene fluoride (col. 9, lines 15-20), and an electrolyte solvent such as acetonitrile, ethanol and toluene (col. 9, lines 45-50). The electrolyte also includes $LiBF_4$, $LiAsF_6$ and $LiPF_6$ (col. 2, lines 15-30) and 1,3-dioxane (Example 1). The negative electrode includes lithium metal and lithium alloys (col. 10, lines 15-20). The electrolyte comprises a 1.4M solution of lithium bis (trifluoromethylsulfonyl) imide (Example 1). Therefore, the instant claims are anticipated by Geronov.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Geronov et al. U.S. Patent 6,344,293 as applied to claims 1 & 5 above, in view of Semel et al. U.S. Patent 5,298,055.

Art Unit: 1746

Geronov teaches a cathodic material comprising 2 to 30% of a binder blend including polyethylene oxide as described hereinabove. The reference also discloses that the electrolyte comprises organic solvents water and lithium salts (see above). Further, the reference is concerned with manipulating the dilution of the electrolyte in order to control the ion conductivity between the electrodes (col. 3, lines 30-55 and

The reference does not expressly disclose a mixing ratio between a binder and an oxide polymer of 1 to 9:9 to 1 in weight ratio.

Semel teaches that it is conventional to employ polymer blends including 30% propylene oxide and 40% of a fluoroelastomer to increase the dusting resistance of the positive electrode (Table 4.1 and 4.2)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the mixing ratio of Semel in the binder blend of Geronov, in order to increase the dusting resistance of the positive electrode.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagiri et al. U.S. Patent 6,576,370 as applied to claims 1 above, and further in view of Carson U.S. Patent 6,488,721.

Nakagiri teaches a cathodic material comprising a polyvinyl pyrrolidone binder as described hereinabove.

The reference does not expressly disclose mixing the binder with isopropyl alcohol in the cathodic mixture.

Carson teaches that it is well known in the art to employ isopropyl alcohol in the cathodic mixture in order to increase dispersion ability of the cathodic material (col. 26 , lines 55-68 and col. 27, lines 1-8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ isopropyl alcohol in the cathodic material of Nakagiri, in order to increase dispersion ability of the cathodic material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagiri et al. U.S. Patent 6,576,370 as applied to claims 1 above, and further in view of Igarashi et al. U.S. Patent 6,573,004.

Nakagiri teaches a cathodic material comprising an acetonitrile solvent as described hereinabove.

The reference does not expressly disclose mixing the solvent with polyvinylacetate in the cathodic mixture.

Igarashi teaches that it is conventional to employ polyvinylacetate in cathodic mixtures in order to minimize reduction in capacity at repeated charge-discharge cycles (col. 3, lines 5-35 and col. 5, lines 10-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ polyvinylacetate of Igarashi in the cathodic mixture of Nakagiri in order to minimize reduction in capacity at repeated charge-discharge cycles.

Conclusions

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (703) 305-0073. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

Art Unit: 1746

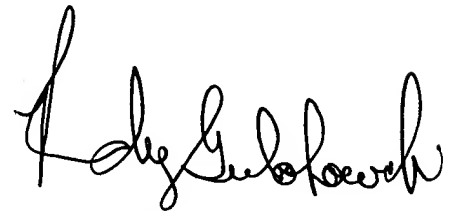
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 703-308-4333.

The unofficial fax number is (703) 305-3599. The Official fax number for non-final amendments is 703-872-9310. The Official fax number for after final amendments is 703-872-9311.

Mw

08/25/03

A handwritten signature in black ink, appearing to read "Randy Gulakowski", is positioned above the printed name and title.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700